



animal & range sciences newsletter

Summer 2019 • Volume 12, Issue 1

MSU to Offer New Ranching Systems Bachelor's Degree Under New Dan Scott Ranch Management Program

A new ranching systems degree that is expected to help sustain the agricultural heritage of the northern Great Plains and Intermountain West will be offered at Montana State University beginning this fall as part of a new umbrella program. The program, called the Dan Scott Ranch Management Program, was approved by the Montana Board of Regents and received accreditation by the Northwest commission on colleges and universities. The program will offer a bachelor's degree in ranching systems; in the future, it will also offer outreach workshops and professional networking for the ranching community. The ranching systems degree will be housed in the Department of Animal and Range Sciences in the MSU College of Agriculture.

The Bachelor of Science degree in ranching systems aims to graduate students with the knowledge and skills to employ prudent ranching practices that create value and improve the state and country's natural resources. "We're really excited to offer this degree," said Patrick Hatfield, head of the Department of Animal and Range Sciences. "We want students (to enroll) who have a strong work ethic, a commitment to the ranching industry and a passion for learning. We hope they will continue a lifetime of learning with the foundation we give them." Hatfield said the four-year degree takes a systems-level approach, meaning that rather than focusing on just one discipline, it will integrate course work and experiential learning in animal production, natural resource management and economics and business, as well as applied skills such as communication, lifelong learning and critical thinking. There will also be a structured experiential learning component through internships with ranch partners across Montana and the region.

continued on page 4



The semester is over. The students have graduated. And, it's almost summer! Our department has been busy over the last few months, but it's been an exciting time.

The Dan Scott Ranch Management Program received final approval from the Board of Regents and included it as a new program under MSU's institutional accreditation with Northwest commission on colleges and universities. The program will begin in Fall 2019. This preeminent ranch management program was developed to sustain and preserve our region's ranching heritage by graduating students who have the breadth of knowledge and diversity of skills needed to employ prudent ranching practices that create value and improve the natural resources vital to Montana. We are very eager to get this new program started.

We had another successful Bair Ranch Foundation Seminar Series with several guest speakers visiting our campus. You can read about them in this newsletter. The series will continue in the fall, so look for announcements coming soon.

We have some new faces in the department. Carla Sanford joined us on May 15th as our new Beef Extension Specialist. A couple of new additions are coming this summer. Rachel Frost will begin her position as Dan Scott Ranch Management Program Leader in July and Sarah McCoski begins her position as Assistant Professor of Animal Reproductive Physiology on June 15th.

As we welcome these new arrivals, we say goodbye to others. Jan Bowman is retiring after a 27 year career of teaching and research. Tom Groneberg, Livestock Operations Manager, is leaving to pursue other opportunities. Shannon Moreaux, Assistant Professor in Equine Science, is leaving for the warmer climate of Hawaii. Emily Meccage, Forage Extension Specialist, has moved back to her home state of Pennsylvania. And, Bryce Kawasaki, Director of the Farrier School, will be leaving in August to pursue another opportunity in North Dakota.

We currently have a new search underway in the department. The search committee for the Wildlife Extension Specialist will be conducting on-campus interviews in June.



Dr. Patrick Hatfield
Department Head

We wrapped up a successful spring semester with Animal & Range Sciences student numbers at almost 350.

Our department welcomed the new Dean and VP of Agriculture, Dr. Sreekala Bajwa on January 14, 2019. She was a featured speaker at The Bair Ranch Foundation Seminar Series at the Museum of the Rockies on January 31, 2019.

We are excited to see sustained growth in our department and look forward to other opportunities that will bring success to the Animal & Range Science Department.

Enjoy your summer!



In This Issue

Cover Story	1	Graduates Spring 2019	24
From the Department Head	2	Awards, Honors and Grants	28
In the News	5	Hello and Goodbye	29
ANRS Briefs	16	Parting Shot	30

Students must apply to the degree program during their sophomore year, and each student admitted to the program will be matched with an internship host ranch for two years beginning the summer after the sophomore year. Each student will have individualized learning objectives based on that particular ranch and then return to the classroom and teach their fellow classmates about the unique aspects of their internship experience. “We want to give students that real-world experience, but we also want to enhance their communication and leadership skills, so they have to come back and take the lead in the classroom,” Hatfield said. “They will be responsible for teaching the other students about the parts of (their internship host) ranch.” Hatfield added that the students’ internship experiences collectively will reflect the diversity of the ranching industry in Montana.

The Dan Scott Ranch Management Program is named for the late Dan Scott, eldest son of Padlock Ranch founder Homer Scott. Dan Scott served as CEO and manager of the ranch for 50 years. Founded in 1943 by Homer and Mildred Scott, the Padlock Ranch is a diversified cow-calf, farm and feedlot operation in Montana and Wyoming. It is run today by Homer and Mildred Scott’s descendants. In addition, the Scott family started First Interstate Bank in 1968 and remains its majority shareholder.

Dan Scott’s daughter, Risa, provided MSU with a \$2 million gift in 2018 in her father’s honor to support the program. To date, MSU has raised \$4 million for the program, with a goal of raising \$6 million, according to Kevin Peterson, MSU Alumni Foundation director of development for the College of Agriculture. The private support will allow the university to hire a program director and set up the unique internship host ranch program for the students. “This transformative program in ranch management would not be possible without the support of many private donors – most notably, Risa Scott’s \$2 million gift to honor her late father, Dan Scott, who was a true leader in the ranching industry,” Peterson said.

Hatfield said there is a great need for the degree program. In 2016, the MSU Jake Jabs College of Business and Entrepreneurship conducted a survey about the field of ranch management that focused on Montana Stockgrowers Association members and other agricultural stakeholders involved in the land and livestock management business. Hatfield said the survey of more than 200 individuals found that there was a high demand for talented management expertise for both large investment-type land holdings and existing ranches. He said the survey found that existing family ranches had the highest need.

“The survey also showed that the need was not only increasing rapidly, but that it could be effectively addressed at a Bachelor of Science level, so long as it integrates systematic thinking education with experiential learning,” Hatfield said. Similarly, Hatfield pointed to a 2015 study from the U.S. Department of Agriculture’s National Institute of Food and Agriculture that showed tremendous demand for recent college graduates with a degree in agricultural programs. According to the report, there are an estimated 57,900 high-skilled job openings annually in the food, agriculture, renewable natural resources and environment fields in the United States. However, on average there are only 35,400 new U.S. graduates with a bachelor’s degree or higher in agriculture related fields, well short of the jobs available annually.

Hatfield said MSU intends the Dan Scott Ranch Management Program to be recognized as the “preeminent ranch management program in the Northern Great Plains and Intermountain West regions. “When these students graduate, we expect that they will have both the foundational academic training combined with experiential training to one day be leaders in this profession,” he said. “We will lay the foundation for these students to be outstanding future ranch managers. We expect most of our graduates will be young men and women, and we realize there is no substitution for real-life experience.”

Individuals who would like to learn more are invited to contact Hatfield at hatfield@montana.edu or Peterson at kevin.peterson@msuaf.org.

When do grizzlies prey on livestock?

Decades of records of grizzly bears preying on cattle and other livestock on grazing land in the Greater Yellowstone Ecosystem have revealed some key ways to limit livestock losses. “Conflicts with livestock are one of the most important obstacles with the recovery of grizzly bears,” said TWS member **Lance McNew**, an assistant professor of wildlife habitat ecology at Montana State University and one of the authors of a study published recently in the *Journal of Wildlife Management*.

The Greater Yellowstone Ecosystem, which includes the national park and surrounding areas in Wyoming, Idaho and Montana, has been a haven for grizzly bears (*Ursus arctos*) ever since they were listed on the federal Endangered Species Act in 1975. Since receiving protection, the bears have recovered in the park and expanded into the surrounding area. “All of the population expansion for grizzlies is outside of the park now,” McNew said.

This has led to conflict with ranchers who keep livestock on grazing allotments in the region, because grizzlies occasionally prey on animals like cattle and sheep. It also costs money, since state agencies often have programs that compensate ranchers when their animals are killed by grizzlies.

McNew and his co-authors wanted to see whether they could find any trends, so they set out to analyze data from more than 300 allotments for incidents that occurred between 1992 and 2014. “One of the major successes of our study is the collation and analysis of long-term, ecosystem-wide public land livestock allotment information, which can be used as a resource for future management, planning and other wildlife-livestock research questions,” said Smith Wells, a data analyst at the Montana Department of Fish, Wildlife and Parks and the lead author of the recent study. Wells was a graduate student at Montana State University during the research.

Once they had all the information in one place, the team analyzed it for trends. Some of the more surprising findings seem to counter the common concept of problem bears. The statistics showed that grizzlies did not seem to change their hunting patterns after learning that livestock can provide an easy meal. The findings suggest that while bears are opportunistic, easy access to livestock didn’t seem to create problem bears.

“The number of depredations in any particular allotment were unrelated to the number of depredations in that allotment in previous years, suggesting bears are killing livestock opportunistically when they encounter them, rather than keying in on particular allotments,” McNew said. Other findings were common sense. Grizzlies preyed on livestock more often when there were more bears around, they found, and they preferred sheep to cattle.



Researchers analyzed more than two decades of records to look for trends on grizzlies preying on livestock in the Greater Yellowstone Ecosystem. ©Jim Peaco

Researchers discovered that areas with higher levels of human activity — roads, human presence or other factors — seemed to help keep the bears away. It also meant that bears went after cows and sheep less when bulls or horses, which involved more hands-on human care, were nearby.

The largest proportion of predation on livestock occurred in the period of increased appetite that bears experience in late July or August in preparation for winter hibernation. This information is critical, McNew said, because it can help inform ranchers and wildlife managers how to minimize grizzly conflict. If humans spend more time around their livestock in these critical periods or choose to graze in areas with less grizzly activity, the number of bear conflicts livestock could be reduced.

If you're grazing in areas occupied by grizzly bears, "you're going to have some losses," he said, but improved knowledge of when they are more likely can lessen the damage. This is particularly true since the data showed that longer grazing seasons did not seem to mean more incidents. If ranchers kept their cattle out another month earlier in the summer, it didn't necessarily make them more vulnerable to grizzlies.

The use of range riders, or livestock protection dogs, may also help lower conflict with grizzlies, and our study provides a foundation from which to explore how these management practices relate to conflicts, Wells said. "The perspectives gained from our analysis provide context for long-term, interagency planning efforts and collaborative livestock-grizzly bear conflict management at the landscape level," she said.

*Story by Joshua Rapp Learn
The Wildlife Society*

Winter Beef Symposia in Havre

The Northern Agricultural Research Center in Havre hosted a beef symposium January 10, 2019. The center is located about seven miles southwest of Havre on U.S. Highway 87. **Tim DelCurto**, Nancy Cameron Endowed Chair in Range Beef Cattle Production, shared research on weak calf syndrome. **Sam Wyffels**, Research Associate in the Department of Animal and Range Sciences, discussed winter feed supplementation and grazing patterns. **Jennifer Thomson**, associate professor of livestock genomics, discussed expected progeny differences for commercial cattle operations. Additional topics included small rodent and coyote control, and Custom Ag Solutions shared information on risks and opportunities in current cattle markets. Sixty people were in attendance.

On January 24, 2019, NARC hosted a second beef symposium. **Megan Van Emon**, Extension beef cattle specialist, shared research on third trimester nutrition. Darrin Boss, NARC superintendent, discussed cover crops and cattle grazing. Jane Mangold, Extension weed and invasive plant ecologist, shared information on cheatgrass control and weed invaders after drought and fire. Local representatives with the Farm Service Agency shared information on livestock programs.

MAES and the College of Agriculture operate statewide agricultural research centers in Montana that address production challenges in the diverse agro-ecosystems of the state. They support research and outreach programs in: crop and animal production methods, market growth opportunities, pest management and disease management, environmental quality issues and agricultural water management research. The research centers are located in Bozeman, Conrad, Corvallis, Creston, Havre, Huntley, Moccasin and Sidney.

Montana State's LIFE Scholars Program changing lives

The Bozeman Chronicle featured a story about MSU's LIFE Scholars Program. One of the students profiled participated in an equitation class this past Spring semester. By Gail Schontzler Chronicle Staff Writer.

How do you ask a horse to walk in a circle, or back up, or move sideways?

LIFE Scholar Derek Seymour, 20, is learning those skills, along with 13 other MSU students in **Andi Shockley's** horse handling class in the Bob Miller Pavilion. "We do different stuff each day," Derek said Wednesday, sitting at his grandparents' kitchen table. "You wheel the rope and you pull the horse towards you."

"We were thrilled" when Derek was accepted into the LIFE Scholars, said his dad, Darryl Seymour. "He missed high school."

"Special needs kids, when they graduate, you wonder what's next," said mom Kelly Seymour. "Will they get left behind?"

Derek, who graduated from Bozeman High School two years ago, has the rare brain disorder Joubert syndrome. He is not going to take academic courses, his mother said, but he can take hands-on courses. This semester he's taking horse handling, billiards and welding. "I'm already welding something together," Derek said haltingly. "Others are still practicing."

"The first semester he was just trying to get used to the program," Kelly said. "Now I think he has more confidence, knows his way around more, feels 'I belong here.'" He has an MSU student Cat Card and is learning to purchase things on his own.

Derek said he has fun on LIFE Scholars outings, like zip lining and snow tubing. He also has a job at Riverside Country Club, helping to set up banquets, and he skis with Eagle Mount.



The LIFE Scholars Program has lived up to their hopes, Kelly said. "Definitely. Christy has done a real good job instilling more independence in him. She helps remind us it's about learning more life skills. It's real fun and special for him to be part of college." "Derek would go forever if allowed to," Darryl said.

Derek Seymour, a Montana State life scholar, smiles as he leaves Emmi in the horse corral after an introductory equestrian class at MSU.

Rachel Leathe, Bozeman Chronicle

Knowledge of wool quality offers ranchers value-added income

The Montana State University Sheep Extension Program hosted its two-day wool handling school earlier this month at the Montana Wool Lab in Bozeman and the Red Bluff Research and Teaching Ranch in Norris.

“The purpose of the Wool School is to help more producers get a higher value by classing wool as it’s shorn instead of taking it as one group,” said Jesse Thompson, executive director of the Montana Wool Growers Association. “They’re trying to help more people get their hands on the wool and be able to tell one quality from the next and to get a higher price out of it.”



Classing and sorting wool as it comes off the shearing floor is nothing new, but industry innovations in fine wool athletic clothing together with last spring’s record high wool prices mean there’s now potentially more money in it. “There’s a very large demand for wool right now,” said MSU Extension Sheep Specialist **Brent Roeder**. “People are really looking for a sustainable source verified product if they can find it. They’re tired of buying ‘plastic stuff’ from overseas and really looking for a high quality American-made product that keeps them warm and provides some value and incentive back to America and their consumers and producers.”

Wool base layers are particularly trendy right now. “A lot of people think of wool as grandpa’s old wool socks but a lot of that’s changing with the new ways to wash the wool, which makes it a softer, thinner material ideal for next-to-skin clothing lines, especially for outdoors people like skiers and snowboarders, farmers and ranchers,” Thompson said. “And it comes from an animal; it’s sustainable, and a lot of people are leaning toward natural, sustainable products these days.”

The March 14 session at the Wool Lab in Bozeman covered wool basics in a classroom setting: biology, genetic selection, testing and processing. The March 15 session at the Red Bluff Research Ranch in nearby Norris was more hands-on, with the group processing wool from the university’s 600 head of sheep. It also covered animal welfare, shearing floor efficiencies, terminology and bag markings, and working the board, skirting table and balers.

“They actually take a sample from each sheep back to the Wool Lab on the MSU campus and measure the fiber diameter, we’ll measure that comfort factor, which is the number of fibers that are less than 30 micron,” said Wool Classer Cheryl Schultz, who helped lead the workshop. “Because we want smaller fibers that are more comfortable next to the skin, we’ll take a staple length on it and then actually measure it on two different devices.” The Micron System separates wool into grades according to the average fiber diameter as measured by a micrometer. This information helps buyers purchase the correct quality and type of wool.

Last year's all-time record high wool prices had to do with international trade demographics. The world's wool is priced on the Australian dollar and traded on a futures market in Australia, where sheep numbers have dropped by about 50 million head over the last 18 years, Roeder said. "That's really benefited Montana and the Northern Great Plains," Roeder said. "Right now, we are the epicenter of fine wool or quality wool production in the United States."



Montana is tied with Wyoming for having the most valuable clip in the United States, according to the most recent national agricultural statistics. "And so, a lot of it is why we do these wool handling schools is basically to maintain that quality of product and production that Montana producers have," Roeder said. "We have the genetics here, but wool has to be put up properly and packaged properly and it competes on an international basis, so we want to make sure that we're maintaining that quality here in Montana."

Pollann Bruner runs 250 sheep south of Whitehall, Mont. She attended the wool handling school to learn how to use a skirting table to discard the dirtier parts of the fleece. "If I have less debris and less short cuttings in my wool, my price goes up," she said. "It really does improve what you get if you cleaned it up a bit. When I get a core sample done, I've been at about 50 percent debris and oils and things like that, and I think I could improve that factor."

Locally, the wool classes are a cooperative agreement between MSU Extension, the Animal and Range Science Department and the Red Bluff Research Ranch. On a national level, they're coordinated by the

American Sheep Industry Association and the American Wool Council. The emphasis on both the local and national level is teaching producers how to sort, package and label wool to ensure they're getting the best price for their product from wool buyers.

"We remove the top knot, which is the wool that grows at the very top of the head. It contains fibers that will not absorb dye because they're hollow. A wool fiber is actually solid and that's why wool has that warm soft appearance to it. Human hair is shiny because it's hollow and it reflects the light. The wool absorbs light. So, what we put in the wool bail is our best quality wool," she said. "The skirting process that we're teaching here today is the final step to add some value because we can even remove some of the sweaty locks that are under the front and rear legs of the sheep. We can remove any stained wool. If there's a belly that's damp, we can take it out."

The parameters – set loosely by the small handful of wool buyers based on feedback from the textile mills in South Carolina and international buyers – change all the time. "The wool buyers basically make some recommendations on a cutoff for a micron. They might say, based on the market conditions and the demand for wool and the price,

looking at the futures market, you should try to pull anything out 25 micron and courser and put it in a separate line because the values not going to be there compared to the finer wool.”

The market for wool is heating up as millennial consumers revel in the fabric’s attributes: it wicks, it breathes, it washes, it’s natural – and it’s increasingly American. With Australian producers tending more toward lamb production, American wool producers, many in Montana, have been able to play their advantage, investing in genetics and realizing the rewards of putting up a good quality clip, Roeder said.

Historically, Montana producers specialize in one of three sheep production systems: fine wool, dual purpose and fast-growing lambs for feedlots and restaurants. Since the 1940s, sheep producers have made most of their income from lamb – and that has crept up. In 2000, probably 85 percent of the income a producer received was from lamb. The wool market just wasn’t there, Roeder said. Today, he said some fine wool producers are generating 65 or 70 percent of their income from lamb and almost 35 to 40 percent off wool.

Montana has a long history with the sheep industry. The first sheep came to Montana in 1869 into the Dillon area, where they will be having 150th anniversary celebration at this year’s Labor Day Rodeo. Sheep numbers in Montana peaked in the millions in the 1920s, before free range grazing waned. Sheep numbers nationally peaked in 1942 with World War II creating demand for wool to make uniforms and blankets and mutton that so many older Americans remember from that time. Numbers trended down for a lot of different reasons – markets, consumer preferences, labor, predators – but there’s been a resurgence in recent years.

“We’re seeing a lot of younger people really interested in getting into the sheep business,” Roeder said. “The startup costs tend to be substantially lower than other agricultural enterprises. A lot of times you can get in on like a weed grazing project or, if you have a small base, you can lamb and shear them.”

Story by Sarah Brown, The Prairie Star



What measures should be adopted to better protect the health and well-being of race horses?

I think it is important for the general public to know there are a number of measures that have been implemented and are being debated, studied and or planned industry-wide. Horse racing has some of the most stringent medication testing and health standards in the sport. The racing industry embraces continued research and improvement of track surface quality and jockey and equine safety measures and recognizes these factors are paramount to the industry's success and popularity. It is great to see leaders from different parts of this classic sport collaborating to continually improve the sport & the horses and jockeys who make it happen for spectators and racing fans.

Would a Triple Crown winner help revive horse racing as a spectator sport in the U.S.?

The author – John Trotwood Moore – once wrote something to the tune of “Wherever we find the footprint of man, from barbarism to civilization, beside it we find the hoof print of a horse.” Indeed, no other animal has been as important to human development or evokes such an emotional response in most humans. Humans love to champion a hero or a winner – especially when the odds are low and the competition high. Like how we all become bobsled or team gymnastics fans every four years. Only 13 horses in one hundred and forty-three years have won the Triple Crown and for most Americans, only five or six have done it in their lifetime. It's remarkable to think there have been two Triple Crown winners in the past four years. At the beginning of every semester that I teach Equine Form to Function to our undergraduate Equine Science and pre-veterinary students, I show several videos of remarkable equine athletes. I still get goosebumps watching a new generation of horse enthusiasts in awe of Secretariat's 1973 campaign! Triple Crown winning campaigns shine a bright light on the industry! They bring renewed interest and investment. In my experience, after American Pharoah and Justify each won the Triple Crown, there was a huge interest spike - people would ask all the time about what makes those horses different, did you think they could do it, how hard is it for a horse to run three very different races on three different tracks that close together, etc. What most people don't realize is those Triple Crown winning horses are loved and cherished long before most people ever hear their names. The real stories are the breeders, grooms, assistant trainers, exercise riders and veterinarians who dedicate their lives to treating those horses like they are one in a million before they are! The glamour and celebration the general public rejoices in for a few weeks a year is the life-giving blood for the people behind the scenes – but they would all do it regardless of the notoriety. They do it for the love of the horse.

Who do you think will win this year's Kentucky Derby?

I am picking, and rooting for, Omaha Beach for various reasons. I spend a lot of time volunteering for a veterans rehabilitation program named Heroes and Horses. I hope the name Omaha Beach itself shines light on fallen heroes the same name and of every generation thereafter. Other than that, I like his breeding, he is coming off of two strong wins, he has the best jockey of the century (IMO) on board, and - for a good luck measure – a horse named Omaha won the Triple Crown in 1935!



Dr. Shannon Moreaux was a Q&A guest in WalletHub's piece about the Kentucky Derby.

Simple request sets MSU student on path to win grant from Gates Foundation



Amanda Leckband, a Montana State University senior who has done extensive work in antibiotic resistance, recently received a prestigious grant from the Bill and Melinda Gates Foundation.

All **Amanda Leckband** wanted to do was borrow a book on celiac disease. It was a simple request, but it got the Montana State University student involved in research, which led to a prestigious grant from the Bill & Melinda Gates Foundation. The senior, who has done extensive work in antibiotic resistance, is now the third person at MSU and the first MSU undergraduate to receive a Grand Challenges Exploration Grant from the Gates Foundation.

The \$100,000 grant she shares with collaborators in Brazil and at the Massachusetts Institute of Technology will allow Leckband to continue her research for 18 months. The Gates Foundation issues the Grand Challenges Exploration Grant twice a year to researchers who have bold ideas for solving the world's challenges. Leckband's team was one of 300 applicants and one of 11 recipients in the latest round of awards. "It's a really nice feather in our hat. It's really awesome," said Leckband, who is majoring in animal science.

David Sands, her mentor and a professor in the Department of Plant Sciences and Plant Pathology in the College of Agriculture, was the first MSU professor to receive a Gates award in 2013.

Leckband's award, he said, is an excellent example of what can happen when undergraduates conduct research. "She's a gem," he said. "When she walks into a lab someday with the Gates award, that will help her."

Sands was also the owner of the book, "The Gluten-Free Edge," that Leckband wanted to borrow. Leckband was taking Sands' introduction to biotechnology class when he talked about the book. Since Leckband, like Sands, has celiac disease, she stopped by his office.

Sands didn't immediately give Leckband the book, but he asked if she liked to read. He asked if she liked to do research. He learned that the animal science major grew up in Brawley, California, an agricultural community that supplies the world with alfalfa, carrots, tomatoes and onions. The conversation continued the next time Leckband stopped by to ask for the book. And the next time. And the next time.

Leckband finally got the book. She also got a job working in Sands' laboratory. That was four years ago, and since then she has been looking for a solution to a global problem: the resistance to antibiotics among calves, lambs and other young animals. With a depleting arsenal for fighting bacteria, antibiotic resistance is a huge problem, Leckband said. If animals can't respond to antibiotics, they can die from scours and other diseases common to newborns.

To improve their chances of survival, Leckband started researching bacterial plasmids and a variety of Ethiopian barley now known as MSU 121. Plasmids carry the genes for antibiotic resistance from one bacterium to another, causing antibiotic therapies to fail. Leckband wanted to find a way to remove the plasmids so antibiotics would work.

Sands, who has been studying barley for 40 years, discovered MSU 121 in the 1980s in an Ethiopian village. Noticing 200 types of barley seeds stored together, he wondered if barley had been important in the village's 8,000 years of existence. "What was in the barley that allowed these people to survive the transition from hunter-gatherers to agrarian farmers?" Sands asked.

Sands' team tested those 200 lines of barley and found one particular strain that was resistant to every virus they introduced to it. Former MSU graduate student R. Vincent Miller published his dissertation about that barley in 1986 and concluded his work by publishing the finding in the *Canadian Journal of Microbiology*.

Building on their work, after a hiatus of 30 years, Leckband planted 15 barley seeds that remained from Sands' research. Then she harvested the new seeds and continued planting and harvesting until she ended up with 1,000 pounds of barley seeds. From them, she developed a barley juice that looked like a green smoothie. She added half an ounce to one gallon of milk and gave it to calves and lambs to drink once a day for three days. The results look promising, Leckband said, but analysis is ongoing and publication of the research is still in the works. The first and third experiments involved calves that lived on the Schaffner Dairy in Holtville, California, near Brawley. The second experiment, funded by MSU's Undergraduate Scholars Program, involved MSU lambs at MSU's Red Bluff Research Ranch near Norris.

The Gates grant will allow her to test her theories on a larger scale, Leckband said. Principal investigator on the project is Bruno Penna from Fluminense Federal University in Rio de Janeiro, Brazil. The Gates Foundation had issued a call to Brazil for research proposals that offered new approaches to the "global burden of antimicrobial resistance,"

and Leckband submitted her proposal through Penna. Also collaborating is Noelle Bryan at MIT.



The project could lengthen the life of new antibiotics and possibly extend the value of existing treatments for animals and humans, Leckband predicted in her application to the Gates Foundation. She added that human and livestock welfare will increase considerably if the team can demonstrate the effectiveness of MSU 121.

On a personal level, Leckband, 29, said she already knows that she was right to pursue research and abandon her plans to attend veterinary school. "Research is something I actually really enjoy," Leckband said. "The networking and the constant learning and teaching ... I love the whole process."

Beet supplements, shelter in winter - and don't forget herd bulls

With the extreme cold and temperatures well below zero amplified by wind chills, cattle may need extra protein and energy. "Supplement requirements will go up in cold spells," said **Megan Van Emon**, Montana State University Extension beef cattle specialist at Fort Keogh in Miles City, Mont.

If the temperature is lower than 10 below, and there is a lot of wind, the requirements for protein and energy are doubled. "If the temperature is 10 below zero, and cattle have a place to get out of the wind, requirements would increase about 50 percent," Van Emon said.

Supplements like lick tubs or blocks can provide some extra protein and energy, and will typically include trace minerals. "If pastures are very poor, adding a higher quality protein and an extra energy supplement source will meet nutrient requirements," she said.

Knowing the nutritional value of hay bales and the forage out in the winter pastures is helpful for making any needed supplement plans.

It always helps to check the nutritional quality of hay bales before unrolling them out in the winter pastures for feeding. To do that, Van Emon recommends sampling 10 percent of bales by taking samples from the core with a hay probe, and sampling from all over the stack. "As bales sit out in the pasture and are exposed to the elements, they can lose nutritional value," she said.

Last year, with very cold temperatures and heavy snow in the winter, cattle hair coats grew quickly, and that helped to keep cattle warm. "We can dress in coats, and we hope cattle can have a nice, thick hair coat as well by this time of year," Van Emon said.

Some breeds do not put on as heavy a coat as other breeds. When cattle get wet, or if the wind blows hard enough to separate the hair, cattle are more exposed to cold and wind. "This year, with the milder winter temperatures, hair coat growth was slower," she said, adding the winter weather in Miles City, where she is based, has been relatively mild this year. However, Van Emon travels often across the state to Bozeman to teach students or gives presentations at workshops all over the state, so she is aware of varying temperatures when she is on the road.

In areas where it has been cold, cattle need shelter to stay warm. Being able to get out of the wind with shelterbelts, ravines, and draws helps, and even wood, steel or fabric windbreaks can protect cattle from the wind when there are no natural breaks in the pasture. "Anytime cattle can get out of the wind, cattle will do better," she said.

Don't forget about bulls, either. Nutrient requirements of bulls increase with cold temperatures also. Bulls may not always be turned out in the best pasture to provide shelter during the winter months.

Remember, bulls may only work a few months out of the year, but they are crucial to maintaining your herd. "Last year, we had some frostbite on the scrotums of bulls in those freezing temperatures, and that affected testicular sperm, which is not good for breeding," Van Emon said.

Make sure the bulls are in a pasture with shelter to get away from the wind and snow.

Many heifers and cows are in their third semester right now, and minerals are important for reproduction and fetal growth. “Depending on your soil type, a good mineral supplement would include calcium, phosphorus, potassium and trace minerals,” she said.

As we prepare for spring, extra magnesium may be needed to minimize grass tetany. Trace minerals, including zinc, copper, manganese, and selenium are required to maintain growth and development of the fetus. “In late gestation and before and after calving, heifers and cows need good protein sources,” she said.



Pastures are currently low-quality, less than 7 percent protein, which will not meet the protein needs of herd. “When cows graze every day eating low quality forages in the winter, the protein element will be most important to ensure they have,” Van Emon said.

At the South Central Cattle and Forage Workshop this winter, where Van Emon spoke, one popular study she discussed was a sugarbeet feeding study with steers. Beets are grown all over south central and eastern Montana. “Sometimes beet producers can’t get the beets out of the ground for harvest due to weather and other factors,” Van Emon said.

Livestock producers can use these areas to graze cattle. When grazing, cattle will eat the beet tops first and may consume some of the beet. Depending on the soil type, cattle may pull the entire beet out of the ground; then the main concern is choking. “The beets and the tops make a good feedstuff for cattle,” she said. “We don’t want them eating a whole, large beet, as it could be a choking hazard.”

However, whole beets can be put through a wood chipper, and the pieces can be fed to cattle. Cattle like the sweet beets, and readily eat them. With the beet supplement, cattle are gaining an excellent energy source. While the beets are good for their rumen, it is not a high starch fiber supplement like oats or corn. Instead, they are a fibrous energy source.

Steers also need crude protein as they grow, and the beets only provide about 4-5 percent protein. “The steers will need a protein source. In addition, cattle will need hay and minerals to meet all their nutritional requirements,” Van Emon added.

For producers who are interested in the results of the study, Van Emon said she found steers could be fed up to 45 percent sugarbeets on a dry matter basis.

A Special Delivery Coming Soon!



Hannah and Sam Wyffels are expecting their first child in July. Congratulations to the Del Curto and Wyffels families, including their canine members!

Expanding Your Horizons: A day of science and math exploration for middle school girls

Expanding Your Horizons offers fun, hands-on workshops in areas like astronomy, paleontology, robotics, health, engineering, veterinary medicine, chemistry and much more! Each year this one-day conference at MSU-Bozeman includes hands-on STEM workshops plus lunch, and group activities.

Dr. Jennifer Thomson along with graduate student **Jordan Hieber** and several volunteers from the MSU chapter of Sigma Alpha, professional agricultural sorority, hosted four workshops on the use of DNA technology in livestock. They extracted DNA from a bovine thymus gland and learned about genetic testing and livestock genetic improvement.



Wool Handling School Photo Gallery



The Bair Ranch Foundation Seminar Series Completes A Busy Spring Schedule

The Bair Ranch Foundation Seminar Series is a seminar series that brings nationally recognized scientists and agricultural professionals to MSU for the benefit of students, faculty, and the public. The series is aimed at fostering greater public engagement and outreach on innovative research, agricultural, and natural resource issues. Each seminar will include a research talk in an effort to provide meaningful opportunities for professional interactions among nationally recognized agricultural professionals, teachers, and researchers, to the students and faculty of MSU. This Spring, six speakers were invited to participate. At the end of the semester, graduate students participate by presenting a seminar on the current work they are doing. For more information, go to <http://animalrange.montana.edu/bairranchfoundation.html>.



Dr. Sreekala Bajwa, Vice President, Dean & Director College of Agriculture & Montana Agricultural Experiment Station, talks with community members during the reception for the Bair Ranch Foundation Seminar Series.



Dr. Sreekala Bajwa talking to the audience at The Bair Ranch Foundation Seminar Series held at the Museum of the Rockies Hager Auditorium.



Dr. Bob Garrott, Montana State University Professor with Fish and Wildlife Ecology and Management Program, presenting at The Bair Ranch Foundation Series on the topic "Montana State University's Collaborative Bighorn Sheep Research: Addressing Respiratory Disease in Bighorn Sheep Through an Integrated Science Program".





Dr. Sam Fuhlendorf, Professor, Natural Resource Ecology and Management, Oklahoma State University presenting at The Bair Ranch Foundation Series on the topic "Using Heterogeneity as a Basis for Rangeland Management".

Dr. Fuhlendorf also presented an evening seminar on the topic "Fire and Rangelands: Historical, Recent Past and Future Role in Conservation".



Dr. Hayes Goosey presenting at The Bair Ranch Foundation Seminar Series on the topic "Sage Grouse Initiative".



Dr. Ryan Thum, Assistant Professor in the Plant Pathology Department at Montana State University, presenting at The Bair Ranch Foundation Series on the topic "Precision Weed Management".



Dr. Katie Dunlap, Professor, Department of Animal Science, Texas A&M University presenting at The Bair Ranch Foundation Series on the topic "Teaching the Changing Demographic of Animal Science Students".

Dr. Dunlap also presented an evening seminar on the topic "Teaching Today's Animal Science Students: Opportunities In and Out of the Classroom".

Students participate in the Regional Academic Quadrathlon

Three Animal and Range Sciences students and one Agriculture Education student participated in the Regional Academic Quadrathlon at University of Idaho in Moscow, Idaho, April 5 & 6. These students beat three other teams at the local contest to be able to compete at the regional. The participants were (left to right) Justin Patch (Senior, Animal Science, Augusta, MT), Gabriele Drishinski (Senior, Agricultural Education, Conrad, MT), Dylan Stenseth (Senior, Animal Science, Buffalo, MT) and Marley Manoukian (Animal Science, Malta, MT). The students developed an oral presentation on consumer perceptions of production agriculture, took a written test as a team, and participated in 8 different practical stations, physiology, meats, genetics, horses, dairy, general animal science, nutrition and reproduction. At each of the practical stations they were required to do some form of hands on work ranging from equipment, plants or feedstuff identification and vaccinations to identification of gene locations based on a model of the pertinent gene. Along with the competition the organizers planned a visit to a dry land farm.



Ft. Ellis gets cleaned up

Faculty, staff and students from the Animal & Range Sciences Department spent two days cleaning out buildings and stalls and doing a little repair work at the Ft. Ellis Research Farm. A few items dated back as far as 1946. Fort Ellis was a United States Army fort established August 27, 1867, east of present-day Bozeman, Montana. Troops from the fort participated in many major campaigns of the Indian Wars. The fort was closed in 1886.



2019 Wool Pool Run

Every May, when cattle ranchers are busy branding and many farmers are planting seed, Montana sheep producers are delivering wool harvested from their flocks earlier in the year. Agricultural Extension Agents Marko Manoukian and Mike Schuldt started a consolidated wool pool in 2002 to take full advantage of economies of scale. A wool pool is a formally incorporated marketing cooperative that markets wool on behalf of producers. The Eastern Montana Wool Pool is a marketing entity that combines the wool from five wool pools across eastern and northern Montana. The Montana Extension Service, Montana Wool Lab, MSU Department of Animal and Range Sciences and Montana Wool Pools all collaborate on the delivery, organizing, grading, transportation and marketing of producer's wool.

All the wool sold in Montana today competes in a global market. Wool is priced on a clean, delivered basis and prices vary with world supply and current fashion trends. Australia is currently the largest producer and exporter of fine wool in the world. As they have reduced their flocks by fifty million head over the last 20 years, there has been restriction in supply and last year saw historic wool prices. As Montana's small and medium sized wool producers are disadvantaged competing in the global market due to their small lot size, the wool pools across Montana play a very important role in keeping them competitive. Montana is one of the few states left with a large number of pools and these pools are very thankful for the support of MSU Wool Lab, ARNR Sheep and Wool program and the local extension service.

With grant funding, the Montana Wool Lab developed a unique trailer to be used by wool pools on delivery day. The trailer functions as a mobile warehouse and weighs, cores and takes quality samples from each bale of wool. The hydraulic capabilities of the trailer allow the handling of large tonnages of wool in short periods of time with minimal worker injury. Bales that do not meet industry standards for weight or packaging are sorted off and combined with like quality wool to reduce transportation costs and contamination from improper packaging. During wool pool deliver, the Montana Wool Lab also brings one of two Lyco balers purchased for growers by the American Wool Council to repackage wool into proper bales that meet weight, length, height, packaging and marking specifications. This equipment provided and maintained by the Montana Wool Lab allows growers to achieve substantial saving in transportation costs when they market wool through the Eastern Montana Consolidated Wool Pool.

At each pool, quality samples are collected from each bale to determine which line the wool belongs. From these samples, fineness, length, yield and strength are determined and compiled by line across pools, so wool can be marketed to international specifications. The OFDA 2000 uses optics and a high-speed camera to determine the average fineness of a sample of wool. Wool of varying fineness has different uses within the industry and must be sorted or classed into different lines. The finer the wool, the more the clip is worth. By providing classing services at the pools and continually educating growers on wool quality and preparation, the Montana Wool Lab and MSU Sheep Extension Program have developed the Eastern Consolidated Wool Pool into a nationally known, reputation



clip. Most of the added value in the wool pool is derived from separating the finer end of the clip. When compared to the USDA reported price for similar micron wool, the Eastern Consolidated Wool Pool Fine line generates substantial income for growers. This is due to not only the quality of the line, but also having a large amount in the line, generating an economy of scale effect. Savings and revenues returned to growers are conservatively estimated at \$89,725 over the last three years for the Eastern Consolidated Wool Pool.



This year's effort involved helping deliver wool with the Eastern Consolidated Wool Pool which consisted of the Front Range Pool in Choteau, Northeastern Pool in Plentywood, Lower Yellowstone Pool in Sidney, Mon-Dak Pool in Wibaux and Hi-Line Pool in Malta. We also helped with delivery of the Beaverhead Pool and Madison/Jefferson Pool in Dillon and the Western Pool in Ronan. The final tally after almost two weeks on the road and three thousand miles was north of 120,000 pounds of wool processed. In closing, it is noted with pride by our Montana producers that much of this wool will be used by the US Military to cloth our men and women in the armed service. This truly cooperative effort would not be possible without equipment and labor provided by the MSU Wool Lab, MSU Extension Sheep and Wool Program, local county extension professionals and volunteer labor provided by local wool pools.

by Brent Roeder, MSU Extension Sheep Specialist



Currently, **Devon Regan** and **Trestin Benson** are working on a WSARE project that is looking to understand the soil and crop yield impacts of integrating livestock into vegetable cropping systems. The three-year project cooperates with three organic certified farms, two here in the Gallatin Valley and one in Boulder, CO. Two workshops will be hosted this summer at Towne’s Harvest and Fort Ellis where tours will be given, and current results and explanation of the study will be discussed. We will announce dates and times for the workshops soon and will post on the ARNR Facebook page and NCATs Facebook page.

By advancing our understanding of the connection between soil health and livestock integrated cropping systems we can possibly create more sustainable farming systems in the U.S. A change such as this will increase profitability, efficiency and environmental health. With the addition of livestock, farmers can provide animals with low cost, high quality forages while adding nutritive inputs back into the soil, thus improving soil health and crop quality and yield. Integrating livestock into cropping systems allows for increases in soil health and productivity and is an efficient use of resources. Thus, it is important to understand the types of impacts integrating livestock has on soil health and crop yield in the Great-Northern Plains on small scale vegetable crops.



Vegetables collected from Black Cat Farms in Boulder,CO.



Sheep grazing squash residue at 13 Mile Lamb and Wool.



Soil sampling at Black Cat Farms in Boulder, CO.

SPRING 2019

Graduate Students – PhD in Animal and Range Sciences

Sam Wyffels

Graduate Students – MS in Animal and Range Sciences

Mark Kurzen

Prospective Graduate Students – MS in Animal and Range Sciences – Summer 2019

Gabrielle Blanchette

John Pulliam

Prospective Undergraduate Students – B.S. in Animal Science

Leigh Apanell	Laura Hansen	Sherrie Proctor
Megan Best	Emily Hilde	Baylie Rodenbaugh
Nicole Bodnar	Lindy Hoza	Sophia Schmidt
Cody Boyce	Elizabeth Johnson	Jack Schmitz
Mary Burt	Jaren Kiff	Madison Schumacher
Taryn Butts	Madisen Lindsey	Jenna Shearer
Carter Clinkenbeard	Stevie Martin	Shantal Smith
Jessica Criss	Brianna McWilliams	Maria Tesoro
Tianna Cronk	Quincy Nussbaum	Amanda Vetch
Shelby Fromm	Justin Patch	Abby Wagemann
Jack Graham	Hailey Phillips	Anna Wright
Mason Haidle	Izzabela Price	

Prospective Undergraduate Students – B.S. in Natural Resources and Rangeland Ecology

Alex Becken	Charles Johnson	Sherrie Proctor
Brandi Carlon	Elisabeth Krieger	Alexander Runyan
Nicholas Davis	Erin Lee	Samuel Tripp
Luke Gunderson	Dillon Moes	Danielle Woods
Emily Holmes	Whitney Morrison	Jacob Zirbel

Prospective Undergraduate Students – B.S. in Animal Science – Summer 2019

Amanda Leckband
Marley Manoukian

Fiona Mott
Dylan Stenseth



Congratulations to all the graduates!

A great celebration of our graduates! Family and friends gathered at the Animal Bioscience Building on the Montana State University campus as we honored students graduating from the Animal & Range Sciences Department. You can read the list of prospective graduates on page 22. Thank you to Denise Thompson for organizing these festivities and Phil Merta for taking pictures.

1. Natural Resources and Rangeland Ecology students
2. Tianna Cronk was recognized as Outstanding Senior. Tianna graduated with a Bachelor's in Animal Science with Science option degree.
3. Animal and Range Sciences students







Joanna Borgogna, Ph.D. candidate in the Yeoman Lab was awarded a University of Washington Annual Principles of STD/HIV Research Course Student Scholarship.

Jennifer Thomson received recognition as the top 1% of “Multidisciplinary” reviewers, who performed the most verified pre-publication peer reviews on Publons for the 2018 global Peer Review Awards. Rankings are calculated by number of verified pre-publication reviews performed and added to Publons between 1 September 2017 and 1 September 2018.



Girl Scouts of Montana and Wyoming awarded the VOLUNTEER OF EXCELLENCE to **Jennifer Thomson**. The Volunteer of Excellence award recognizes volunteers who have contributed outstanding service in support of mission delivery to girl and adult members at the troop level.



Jordan Hieber was awarded a College of Agriculture Student Scholar Travel Award to help with expenses so she can present a poster at the American Society of Animal Science national meeting in July.

At the left, Jordan also presented her poster during the 2019 Nutrition Conference in Bozeman.

Grants:

Bair Ranch Foundation, \$113,210, A comparative approach to refine molecular mechanisms impacting meat quality and carcass characteristics, **Jennifer Thomson** and **Jane Ann Boles**

Bair Ranch Foundation, \$50,171, Functional Genomics and Metabolomics of Grazing Beef Cattle, **Bret Olson** and **Jennifer Thomson**

Faculty Excellence 2020, \$4,605, Travel grant to present research at 6th EEAP International Symposium on Energy and Protein Metabolism and Nutrition in Belo Horizonte, Brazil, **Jennifer Thomson**

Publications:

Pafco B, Sharma AK, Petrzalkova KJ, Vlckova K, Todd A, **Yeoman CJ**, Wilson BA, Stumpf R, White BA, Nelson KE, Leigh SR, Gomez A. 2019. Gut microbiome composition of wild western lowland gorillas is associated with age and sex factors. *American Journal of Physical Anthropology*. 9: 1202. DOI: 10.3389/fmicb.2018.01202

Miles MP, Wilson S, **Yeoman CJ**. 2019. Physical activity and inflammation phenotype conversion. *Journal of Clinical Exercise Physiology*. In press.

This article was recently recognized as the 19th most read paper in *Nature's Scientific Reports* of 2018:

Nelson TM, **Borgogna JC**, Michalek, RD, Roberts DW, Rath JM, Glover ED, Ravel J, Shardell MD, **Yeoman CJ**, Brotman RM. 2018. Cigarette smoking is associated with an altered vaginal tract metabolomic profile. *Scientific Reports*. 8: 852. PubMed PMID: 29339821; PubMed Central PMCID: PMC5770521; DOI:10.1038/s41598-017-14943-3

Hello

Although we mentioned her in the last newsletter, we want to officially welcome **Carla Sanford** as the new Extension Beef Specialist. Her first day was May 15th.

Rachel Frost will begin her position as Dan Scott Ranch Management Program Leader in July.

Sarah McCoski begins her position as Assistant Professor of Animal Reproductive Physiology on June 15th.

Shay Larsen has been working as the new Assistant Farm Operations Manager, but he hasn't received his formal welcome.

Goodbye

Jan Bowman is retiring after 27 teaching in the Animal & Range Sciences Department. Happy trails, Jan!

Tom Groneberg is leaving his position as Farm Operations Manager to pursue other opportunities.

Emily Meccage, Forage Extension Specialist, moved back to her home state of Pennsylvania.

Bryce Kawasaki, MSU Horseshoeing School Director, is leaving in August to for another job opportunity in North Dakota.

Shannon Moreaux, Associate Professor and Equine Extension Specialist, is leaving to pursue other opportunities.

Visit our website at animalrange.montana.edu

Find us on Facebook at facebook.com/MSU.Animal.Range.Sciences

Email newsletter comments to sharon.henderson@montana.edu



As the result of the record-setting snowfall in February, JT Saunders, Red Bluff Ranch Manager, worked hard to clear the route for shearers so they could get their equipment to the shearing barn. The Wool Handling School was held in March and the facilities and sheep were ready to go!

The mission of the Animal and Range Sciences Department is to create, evaluate and communicate science-based knowledge to enhance the management of Montana's livestock and rangeland resources in ways that are economically, socially and ecologically sustainable.

